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15. Supplementary Notes The Coast Guard technical contact and COTR is Kenneth Bitting, 860-441-2733. The Technical Review Committee consisted of chairman Mr. Kenneth Bitting (R&DC), and members Mr. Kurt Hansen (R&DC), CDR Christopher Doane (G-SEC-2C), LT Thomas Callahan (G-MOR-3), LT Michael Pittman (G-MOR-1) and CWO Timothy Malcolm (AST).					
16. Abstract (MAXIMUM 200 WORDS) A technology assessment has been conducted to analyze the threat of oil spills in fast currents. Technologies and methods for response were evaluated, and promising equipment and strategies were identified. Recommendations are made to pursue those methods, equipment, and training that show the most promise for improved oil spill response capabilities in currents from 1 to 6 knots. Recommendations include technology development, testing, and field demonstrations. In addition, regulations, guidelines and training requirements for the USCG and the oil spill response industry were reviewed to determine their adequacy for fast water response. Improvements are suggested to make these practices more useful. Containment and removal of oil spilled in rivers and coastal tidal regions, where currents exceed one knot, is very difficult because many skimmers and conventional booming methods are not effective in fast currents. Under fast water conditions, the oil must be skimmed as it goes by the recovery device, or the surface current containing the oil must be slowed down without causing entrainment within the skimmer or boom containment system. The benefits and liabilities of high-speed skimmers and specialized boom systems are reviewed for fast water conditions. Promising deflection strategies are shown. Alternate containment and diversion techniques, including pneumatic boom, horizontal air and water jets, plunging water jets, diversion paravanes, and floating paddle wheels, are also analyzed.					
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Executive Summary

During the past six years, 58 percent of all oil spills 100 gallons and larger have occurred in fast-current waterways. This figure represents 4.5 million gallons of oil spilled in swift flowing rivers, harbors, bays and coastal areas where conventional boom and skimmers are often ineffective. Despite these statistics, very little research and product development has been conducted on new technologies and strategies to combat this problem. Many Oil Spill Response Organizations (OSRO), industry, and the U.S. Coast Guard (USCG) are not completely prepared to respond to oil spills in these difficult and challenging conditions.

This report is an assessment of technologies and methods that have the potential to be used to control and remove floating oil from fast-water rivers and coastal areas where currents exceed one knot. Historical oil spills and fast current areas potentially vulnerable to oil spills were identified in order to define the scope of this problem. Key fast-water regions and response organizations were surveyed and visited. Scenarios were then developed in order to identify promising equipment, strategies and training required to control oil spills more effectively in those conditions. This report also identifies the most promising equipment, techniques and training currently available worldwide and recommends a course of action to improve them for the U.S. Coast Guard and industry. In addition, USCG regulations and guidelines for industry oil spill response plans and OSRO classifications were reviewed to determine if they adequately address containment and recovery of oil in fast waters. Areas that were researched and analyzed include:

Containment and Control

Traditionally, deflection booms are used to contain oil for recovery or exclude it from sensitive areas. A number of innovative technologies and strategies were identified that show the promise of being effective in fast water. These include cascade booming, the Canadian Petroleum Producers (CPP) system, boom deflectors, a current rudder, and flow diverters. Some of these methods may also be useful when deploying other systems from vessels. Problems encountered with this technology can be minimized in a number of ways and are outlined.

Recovery

Several commercial high-speed skimmers and other skimmers that were never made commercially, can recover oil at speeds ranging from 1 to 6 knots. Most, however, start to lose throughput and recovery efficiencies at speeds above 3 knots and as waves increase in height. Specialized boom systems have also been successful in fast water. Effectiveness of V-shaped boom that was procured by the Coast Guard was increased to 3 knots. The University of New Hampshire is developing a rapid current boom that uses submergence plane technology to trap and contain oil in currents up to 3 knots. Skimmers and boom systems that are effective in fast currents have also been adapted for use on ships, providing improvements in oil recovery rates.

Training

Three industry courses were evaluated to determine their effectiveness in presenting technology and teaching strategies used to contain and recover oil in high-speed currents. These five-day courses were not dedicated to fast-water oil containment and none of them covered the subject comprehensively. The Coast Guard National Strike Force (NSF) relies on these industry courses along with in-house training using Coast Guard equipment. This is inadequate due to the broad scope of the courses and lack of fast-water response equipment in the Coast Guard inventory.

USCG Regulations and Guidelines

Vessel and facility response plan regulations and OSRO classification guidelines do not address requirements specific to fast-water oil spill containment and recovery. This regulatory omission allows proposed booms and skimmers to be accepted for response plans and OSRO classifications although they are often ineffective in local high-speed current environments. Industry training requirements are vague and cursory concerning response with equipment, and do not address considerations for fast water conditions.

Significant research and development was conducted in the 1970s and early 1980s; however, very little has been done to improve the state-of-the-art in the past ten years. There is a need to develop and test promising equipment and strategies. Field demonstrations and equipment tests are recommended to perfect the technology and concepts for real-world

scenarios. A technology transfer program should be formalized so that Government sponsored spill response research is made available to the public in a form that can be easily understood and used. Training should be developed that comprehensively addresses control, containment and recovery of oil spills in fast currents. Improvement of in-house training techniques, development of a field-guide, and establishing civilian equipment specialists billets at CG Strike Teams are recommended to improve response capabilities in fast-water and other oil spill response situations. USCG regulations and guidelines concerning response plans and OSRO classifications, respectively, should be revised to address response resources limited by currents above one knot and fast water scenarios that require special strategies, equipment, and training. No incentives exist for the oil industry to develop new technologies, strategies, and training methods. A change of philosophy toward efficient spill responses by government regulators, the oil industry, and the insurance underwriters is needed so that new fast-water oil spill technology and other oil spill response innovations are developed.